DAVID W. TAYLOR NAVAL SHIP
RESEARCH AND DEVELOPMENT CENTER

Bethesda, Md.   20084

DATA ENTRY ABOARD SHIP
U.S.S. MULLINNIX (DD-944)
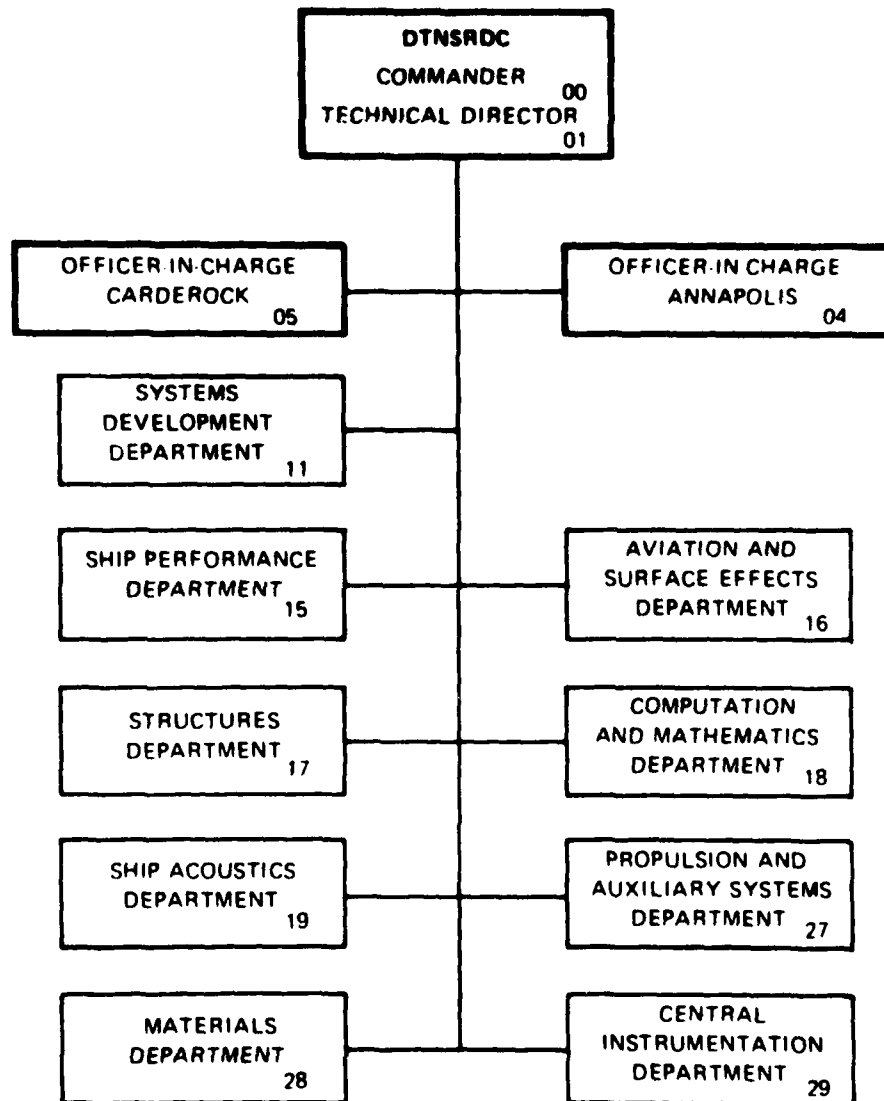
SHIP TRIAL REPORT

by

Ronald N. Koontz
Jack A. Jeffers

COMPUTATION AND MATHEMATICS DEPARTMENT
DEPARTMENTAL REPORT

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OCT 14 1976

June 1975

CMD-07-76

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
CMD-07-76		

4. TITLE (and Subtitle)	5. TYPE OF REPORT & PERIOD COVERED
DATA ENTRY ABOARD SHIP - U.S.S. MULLINNIX (DD-944) - SHIP TRIAL REPORT.	INTERIM REPORT, 1 Apr-12 May 75.
	6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s)
Ronald N. Koontz Jack A. Jeffers	

9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
David W. Taylor Naval Ship R&D Center Bethesda, Maryland 20084	62760N TF53531045 1-1867-012

11. CONTROLLING OFFICE NAME AND ADDRESS	12. REPORT DATE
Naval Supply Systems Command Code 043 Washington, D.C. 20376	June 1975
	13. NUMBER OF PAGES
	29

14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report)
	Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

TF53-531, NShDC-1-1867-012

18. SUPPLEMENTARY NOTES

TF53-531-045

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Shipboard Data Processing
Microprocessors
Logistics
Source Data Automation

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report documents the results of a shipboard test, on the DD-944, of the Data Entry Aboard Ship (DEAS) breadboard system. A six week test of supply and maintenance applications was conducted using ship's data and personnel to exercise the system. This initial test of system concept feasibility was generally successful.

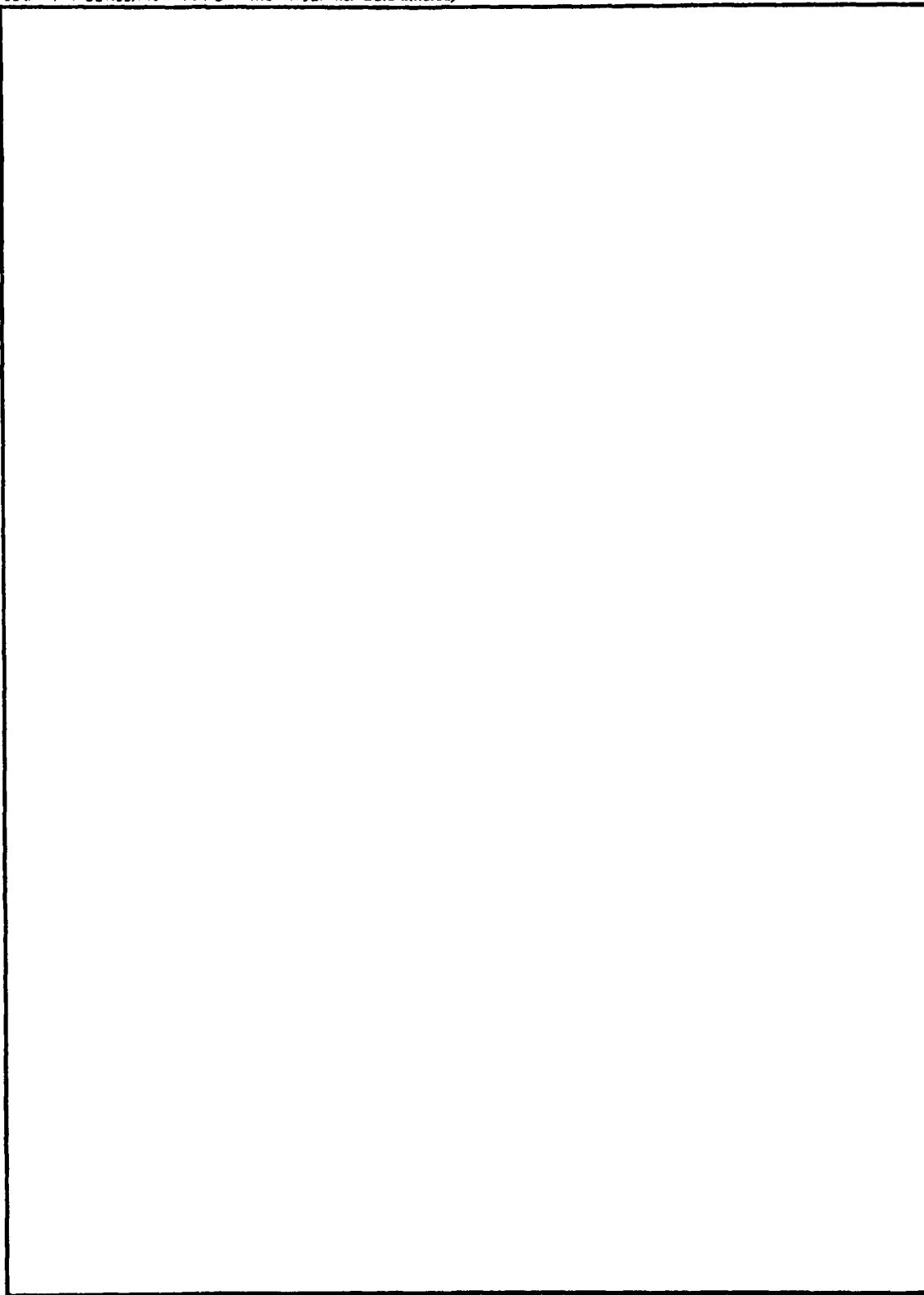DD FORM 1473   EDITION OF 1 NOV 65 IS OBSOLETE
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I. INTRODUCTION

A. GENERAL OBJECTIVES

The Data Entry Aboard Ship (DEAS), an automated logistics system concept, was tested for six weeks (1 April 1975 - 12 May 1975) on board the destroyer, U.S.S. MULLINNIX. The purpose of the shipboard test was to evaluate the viability for DEAS to support and effectively execute shipboard logistics services involving both in-port and at-sea conditions.

The DEAS project utilizes prototype equipment consisting of an intelligent terminal (8 K programmable), printer, card reader, CRT, and three cassette tape drives. The DEAS equipment was hand-carried aboard the U.S.S. MULLINNIX and installed on a desk top located in the supply office in approximately one hour. Naval Ship Research and Development Center (NSRDC) personnel checked the equipment for breakage, plugged in the components, tested the system software, and were running the DEAS system for training purposes within minutes.

The DEAS test objectives for the shipboard experiment were to:

1) Evaluate the performance of the DEAS breadboard equipment under at-sea conditions,

2) Train shipboard supply personnel, and evaluate their adaptability to Data Entry procedures and the use of an automated supply system,

3) Operate the DEAS logistics system in parallel with normal shipboard logistics operations,

4) Test and evaluate the newly developed shipboard maintenance system which produces a local Current Ship's Maintenance Project (CSMP) report and a Ship's Maintenance Completion report.

B. DEAS TRAINING SCHEDULE - SUPPLY SYSTEM

Phase one of the shipboard test was to train available supply personnel
to use the DEAS hardware and create master files containing the SIM stock
records, the 1348 Outstanding File (Requisitions and Status), and a repre-
sentative segment of the 12,000 non-Sim stock records. Several men from
the supply department participated in the DEAS test on a part-time basis,
notably an SK-3 and the supply department Chief Petty Officer. The SK-3
and Chief Petty Officer were given two 2-hour training sessions to familiarize
them with the data entry of forms and the master file search program in the
DEAS system. The training included:

1) How to handle cassette tapes and change printer
paper,

2) Load data entry programs (supply forms) into
computer memory,

3) Switch from one data entry program to another,

4) Key in data to complete the displayed supply
forms,

5) Learn the validation and correction features for
the displayed supply form,

6) Learn to switch to the search program and inter-
pret the displayed data fields of the 1114 stock
record or the 1348 requisition and status records,
and

7) Learn the proper open and close down procedures of
the DEAS computer.

After the training sessions, the supply departments' SIM, one hundred
(representative segment) Non-SIM stock records, and several hundred 1348
requisitions were keyed into the DEAS system. In a period of three weeks,

working two or three hours per day, the Navy personnel assigned to the project and the NSRDC research personnel were able to create the Sim and non-Sim master files, plus the 1348 Outstanding File (Requisitions). The following average for record input by the Navy personnel was established:

1) Approximately 925 manual records were keyed for the files, and

2) A total of 50 man-hours was utilized.

This is approximately the same amount of time a sailor requires to type or keypunch the same supply records. The supply department personnel adapted to the DEAS method of inputting records as quickly as they would adapt to a typewriter.

The next phase of the DEAS test was to run parallel to the supply department manual systems. The supply department personnel spent 10 hours during the third and fourth week to train and familiarize themselves with all facets of the DEAS supply system. Included in their training were such points as: 1) key input of 1250 issues, 1348 requisitions, status messages, 1114 Sim and non-Sim data changes, and 1348-1 receipts; 2) cassette tape changing to provide input and outputs required by various DEAS programs; 3) creating new daily master files and storing yesterday's master files; 4) performing all functions of program selection, updating master files, generating reports; 5) audit trail-reject lists were produced and studied to check accuracy of inputs to update the master files; and finally, 6) producing reports to determine reorder quantity, latest status and progress of outstanding requisitions, and data field maintenance required for stock records.

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Following the 10-hour training period, the supply personnel were able
to operate the DEAS system in parallel with the manual supply system. Due to
the other duties assigned to the supply department personnel, the NSRDC
research personnel also performed various DEAS update and system requirements.
In general, the DEAS system data entry, file update,and report generation
effort can be measured in two distinct areas -- 1) in-port work requirements,
and 2) at-sea work requirements.

In-port work requirements performed by the DEAS system averaged three
hours per day. Three hours is an indication of total computer time required
for processing the more limited supply information used by the DEAS systems.
Supply duties not performed by DEAS at the time of the test were Optar
reporting and financial reconciliation. Also excluded from actual computer
time is the need for supply personnel to provide continuous monitoring of
the Sim and Outstanding files, expedite orders, provide back order reconcil-
iations, provide historical demand review, physical inventory checks, etc.

At-sea work requirements for the DEAS system averaged two hours or less.
During deployment of a Naval ship, there are usually fewer duties performed
by supply department personnel.

C. DEAS TRAINING SCHEDULE -- 3-M SYSTEM

Another objective for the DEAS test was to evaluate the newly developed
shipboard maintenance system. The DEAS automated maintenance system was
designed to provide data entry validation for the 2-kilo maintenance form
generated by all departments within the local ship. Secondly, the DEAS

maintenance system was to provide a direct tie-in for 2-kilo maintenance jobs which interface with the supply department. The interface between departments and the supply department would provide the various departments within the ship a printout showing the 2-kilo job, the 1250 issues delivered to the supply department and completed by the supply department, plus any 1348 requisitions which were created by the supply department in order to fill the 1250 issue request.

The printout for the local ship's departments is listed in Figure 1. Figure 1 resembles the 3-M system printout, CSMP Option 3. The DEAS system has modified the CSMP to reflect a local ship's CSMP containing the departments 1250 issues and any 1348 requisitions initiated by the 1250. Further modifications are suggested by the DEAS personnel, but the first attempt to interface supply files (1348 requisition with document number should be noted) and departments' 2-kilo jobs was favorably received by the local ship's commanding officer, department heads and division heads.

Figure 2 (Project Completion Report) gives ship's departments a completion report. This lists the completed 2-kilo job with accompanying 1250 issues and 1348 requisitions. (A simple modification by the DEAS personnel can provide man hours expended and date completed for the Project Completion Report, thus providing each division head a convenient tool to estimate work hours.)

During the DEAS test, NSRDC personnel collected various 2-kilo and 1250 issue information from the ship's departments. Approximately 75 2-kilo forms were keyed into the DEAS system, thus creating a maintenance master

CURRENT SHIPS MAINTENANCE PROJECT REPORT 1 - OPTION B

SUMMARY BY WORK CENTER

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USS MULLINNIX   DD 944   UIC-52203

WORK CENTER GE01

JSN	NOUN NAME	IDENT	CSMP SUMMARY		HOURS EXP	DEFR DATE	DEFR REAS	PRI	SCRN ACTN	---DEF S/F	MAN HOURS--- IMA DEP	DEAD DATE
C974	AN/SPS-40C	A3	REPAIR SHIP'S HEAD MARKER		0002	5029	1	3		0010		
	1250	STOCK NUMBER	QUANT	UI	MRD	EIC						
		5950009954733	00001	EA	5099	F31V	57039660					
	1250	STOCK NUMBER	QUANT	UI	MRD	EIC						
		6810002279540	00004	BT	5099	P31V	57039660					
	1348	STOCK NUMBER	QUANT	UI	DOCUMENT NUMBER		REMAINING DATA FIELDS					
		6810002279540	000004	BT	V52203 5107 3312		EK506	0001472				
	1348	STOCK NUMBER	QUANT	UI	DOCUMENT NUMBER		REMAINING DATA FIELDS					
6		5950009954733	000001	EA	V52203 5099 3772		EK506	0035100				

JSN	NOUN NAME	IDENT	CSMP SUMMARY		HOURS EXP	DEFR DATE	DEFR REAS	PRI	SCRN ACTN	---DEF S/F	MAN HOURS--- IMA DEP	DEAD DATE
C997	AN/SRC-21	F-9	REPLACE PHONE JACK		0001	5006	2	2		0002		
	1250	STOCK NUMBER	QUANT	UI	MRD	EIC						
		3430 23200	00001	EA	5079	G035	57112100					
	1250	STOCK NUMBER	QUANT	UI	MRD	EIC						
		5820009913440	00001	EA	5079	G035	57112100					
	1348	STOCK NUMBER	QUANT	UI	DOCUMENT NUMBER		REMAINING DATA FIELDS					
		5820009913440	000001	EA	V52203 5119 3615		EK506	0005800				
	1348	STOCK NUMBER	QUANT	UI	DOCUMENT NUMBER		REMAINING DATA FIELDS					
		343-0282-00	000001	EA	V52203 5093 3588		EK506	0003000				

JSN	NOUN NAME	IDENT	CSMP SUMMARY		HOURS EXP	DEFR DATE	DEFR REAS	PRI	SCRN ACTN	---DEF S/F	MAN HOURS--- IMA DEP	DEAD DATE
C998	TEC /KG-14	3136	TEMPEST REQUIREMENT		0001	5079	2	2		0002		

Figure 1

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PROJECT COMPLETION REPORT

SUMMARY BY WORK CENTER

USS McGINNIX   DD 944   UIC-52203

WORK CENTER 0E01

JSN	NOUN NAME	IDENT	CSMP SUMMARY				HOURS EXP	DEFR DATE	DEFR REAS	PRI	SCRN ACTN	---DEF S/F	MAN HOURS--- IMA / DEP	DEAD DATE
C954	AN1SRC-20	F358	REPLACE 50G CLOCK				0006	5051	2	3		0009		
1240	STOCK NUMBER 5820003067763		QUANT 00001	UI EA	MRD 5051	EIC OO3R	AFL/AEL 57112000							
1240	STOCK NUMBER 5820007750495		QUANT 00001	UI EA	MRD 5101	EIC OO3R	AFL/AEL 57112000							
1348	STOCK NUMBER 5820007750495		QUANT 000001	UI EA	DOCUMENT NUMBER V52203 5104 3779		REMAINING DATA FIELDS EX506 5G 0000000							
1348	STOCK NUMBER 5820008089763		QUANT 000001	UI EA	DOCUMENT NUMBER V52203 5093 3610		REMAINING DATA FIELDS EX506 0009400							

JSN	NOUN NAME	IDENT	CSMP SUMMARY				HOURS EXP	DEFR DATE	DEFR REAS	PRI	SCRN ACTN	---DEF S/F	MAN HOURS--- IMA / DEP	DEAD DATE
C972	SE-1505C/SP	A10	REPLACE LIGHT BULBS				0001	5027	2	4		0001		
1240	STOCK NUMBER 5961008522601		QUANT 00002	UI EA	MRD 5058	EIC P90V	AFL/AEL 85215003							
1240	STOCK NUMBER 5961007231059		QUANT 00001	UI EA	MRD 5055	EIC P90V	AFL/AEL 85215003							
1240	STOCK NUMBER 5961000520666		QUANT 00002	UI EA	MRD 5053	EIC P90V	AFL/AEL 85215003							
1240	STOCK NUMBER 4210 E14		QUANT 00001	UI EA	MRD 5058	EIC P90V	AFL/AEL 85215003							
1348	STOCK NUMBER 5961000520666		QUANT 000002	UI EA	DOCUMENT NUMBER V52203 5097 3650		REMAINING DATA FIELDS EX506 0000244							

Figure 2

file. Existing documentation for many of the 2-kilo forms proved to be
unavailable, therefore, the OE division was selected to provide 1250 infor-
mation due to their complete record-keeping. Twenty 2-kilo forms were
researched and accompanying 1250 issues were established for the DEAS
maintenance system.

Next, the DEAS maintenance system is designed to incorporate the supply
department, 1348 outstanding file, requisition records to complete the
information produced on the local ship's CSMP. A side product of the DEAS
system allows the various departments to query supply department stock
records in order for the department personnel to produce up-to-date 1250
issue information. The local CSMP was produced on a three to four days
basis.

II. SHIPBOARD OPERATION

A. ENVIRONMENT

The DEAS shipboard test was assigned two adjoining desks in the supply office of the U.S.S. MULLINNIX. The equipment was set up on the two desks in the following configuration:

1) The processor unit (including CRT, 3 cassette tape drives, and keyboard) was placed directly on top of the right-most desk. The machine was secured so that it would not fall off the desk top during heavy seas. This left ample work area on the desk for the operator.

2) The printer was placed on top of padding on the left-most desk and connected to the processor. The padding consisted of one sheet of 1/2" rubber padding, one sheet of 1/2" felt padding and another sheet of 1/2" rubber padding. The padding accomplished two things. First, it provided a non-skid surface on which to place the printer. Second, it reduced the vibration transmitted from the printer to the desk which is an annoyance to an adjacent operator in a confined space.

3) The card reader was placed on the deck, directly below the printer. There was space to place it on top of the desk, but this was not done for ease of operation and because it was used infrequently.

4) Cassette tapes not in use, extra printer paper, and
   NSRDC personnel belongings were stored on the deck
   behind the card reader.

The equipment was on-loaded 1 April 1975 and off-loaded 9 May 1975.
It was in use 32 of the 37 days between 2 April and 8 May. It was used a
total of 82 hours and 40 minutes during 16 days at sea and a total of 86
hours and 20 minutes during 16 days in port. The equipment operated without
failure. It was subjected to two days of shipwide electrical system power
fluctuation drills, high speed runs of up to three hours at 27 knots, heavy
seas up to sea state 6, the vibrations of the 5-inch gun firing from directly
overhead, and coffee spills from supply personnel getting coffee from the
coffeepot located behind the printer.

B.   TEST SCHEDULE AND DESCRIPTION

This DEAS shipboard test was composed of training, data file creations,
and operation in parallel with actual ship's work. Ship personnel were
trained on an as-available schedule. Training for each person was two
2-hour periods for the data entry portion of the system and a total of 10
hours for the update and report generation portions of the system. Actual
ship's transactions were entered and processed during the training periods
for maximum usage of the personnel. The file generation and transaction
processing schedule is shown on the following page.

Inclusive Dates	Accomplishments
2 April - 6 April	Create the SIM stock record file containing all of the ship's SIM stock items.
3 April - 8 April	Create a partial maintenance file.
16 April - 26 April	Create an outstanding requisition file containing the ship's high priority outstanding requisitions (Pri 2-9) and all outstanding requisitions for SIM items.
27 April - 7 May	Add some of the status messages in the ship's file to the outstanding requisition file.
1 May - 2 May	Create a representative Non-SIM stock record file.
5 May - 6 May	Add some of the recent electronic division's actions to the maintenance file.
8 April - 5 May	Process all supply transactions affecting the SIM and outstanding files. Approximately 100 of the Non-SIM and not-carried transactions were also processed.

Data entry of a typical form was accomplished at an average rate of
one every two minutes. Additional processing for updating, error correction,
and report generation averaged one minute per form. During the DEAS ship-
board test aboard the U.S.S. ALBANY in the Fall of 1974, it was found that
an operator can comfortably enter and print one form a minute. Two of the
general reasons for the slower rate during this test are listed below
(some specific reasons are detailed later).

1. The personnel were invariably interrupted to perform other
    duties. A breakdown of the operator's time into DEAS and
    ship's operational duties during a DEAS utilization session
    was not attempted. In addition, measurements of interruptions
    unconnected with either were not broken out.

2. In order to obtain the representative record collections
    contained in the Outstanding and Maintenance files, the
    operator was required to find, pull, input, and then replace
    records from ship's files. This manual handling consumed a
    good deal of time, since the records were not consecutive.
    That handling was not separated from the data entry times
    recorded.

The data entry times could have been significantly decreased by
eliminating the printing of each input form. The forms were printed for
monitoring and documentation purposes of the NSRDC personnel.

DEAS EQUIPMENT USAGE TIMES

Function Performed	At Sea	In Port	Total	Important Averages per Day
A. DEAS System				
1. Training	6:00	6:40	12:40	
2. Creating Data Files				
a. SIM Stock Records	--	12:20	12:20	
b. Outstanding Requisitions	20:40	2:45	23:25	
c. Status	7:30	3:50	11:20	
d. Non-SIM Stock Records	--	3:45	3:45	
e. Maintenance	--	11:10	11:10	
3. Process Normal Supply Transactions	9:25	12:55	22:20	0:42
4. Demonstration, Monitoring, and Additional Backup Tape Creation	7:40	18:15	25:55	
Subtotal	51:15	71:40	122:55	3:51
B. Hardware Testing and Programming	31:25	14:40	46:05	1:20
Total	82:40	86:20	169:00	5:17

NOTE: Times are given in HOURS:MINUTES.

SEAS PROCESSING AVERAGES

Function Performed	Data Entry Time	Update, Review, and Report Time	Total Time	Number of Transactions	Average Number of Transactions Entered	Average Number of Transactions Fully Processed
1. Creating Data Files						
a. SIM Stock Records	9:00	3:20	12:20	365	41	30
b. Outstanding Requisitions	16:30	6:55	23:25	328	20	14
c. Status Messages	7:20	4:00	11:20	124	17	11
d. Non-SIM Stock Records	2:30	1:15	3:45	108	43	29
e. Maintenance	8:10	3:00	11:10	117	14	10
2. Process Normal Supply Transactions	14:20	8:00	22:20	550	38	24
Total	57:50	26:30	84:20	1592	28	19

NOTE: 1. Data entry time includes time required to obtain the transaction from the ship's files.

2. Times are given in HOURS:MINUTES.

3. Averages are given in number of transactions per hour.

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C. TEST SEGMENT DESCRIPTIONS

1. Training Supply Department Personnel

Seven supply department enlisted personnel were utilized in
this DEAS shipboard test. Two were trained to use the entire system.
The other five were trained in the data entry portion of the system.
In addition, four non-supply enlisted personnel were trained to operate
the equipment using a set of manufacturer supplied games programs. None
of the personnel experienced any difficulty in learning to use the system.
All of them were able to load a cassette program tape, initiate programs,
and run programs by following the directions given on the CRT after two
or three minutes training. Supply personnel easily adapted to the DEAS
automated supply system. Even new supply personnel, with little or no
previous shipboard experience in supply, quickly learned to understand and
use the DEAS supply system. In fact, the naturally hectic training
schedule of new supply personnel in the busy, "fire-drill" atmosphere of a
ship's supply office makes the automated system a more efficient and
effective way to train such personnel into viable working members of the
supply department.

SCHEDULE OF EQUIPMENT TIMES USED IN TRAINING

Date	Total Time	Personnel	Accomplishments
2 April	2 hrs. 10 mins.	SK1 Ladia SK3 Jones SK3 Edwards SA Manansala SA Medina	Hardware operation and data entry.
3 April (A.M.)	1 hr. 55 mins.	SA Imadhay SA Medina	Hardware operation and data entry.
3 April (P.M.)	1 hr. 5 mins.	SK3 Jones	Data entry, updating and report generation.
4 April	1 hr.	3 non-supply personnel	Hardware operation.
9 April	1 hr. 30 mins.	SK3 Jones	Entire supply system
18 April	1 hr. 30 mins.	SKC Pellom SK3 Jones	Data entry. (Note: the Chief was trained by the Third Class.)
20 April	3 hrs.	SKC Pellom	Entire system.
2 May	30 minutes	1 non-crew supply personnel	Hardware operation and data entry.

2. SIM Stock Record File

The SIM stock record file is a duplicate of the ship's own manual file. It was the first file created. A SIM file of 359 items was built between 2 April and 6 April. The supply office's daily transactions were processed against this file during the remainder of the time that the DEAS system was aboard the ship. Six more items were added to the file as a result of items becoming SIM during the remaining period. The creation of the SIM stock record file took 12 hours and 20 minutes of computer usage for an average of 29 items per hour. This time includes printing, updating, correction, and report generation times. Some of the personnel training time is included in this figure, since training and SIM file creation were combined in order to speed up the creation of the file. It was actually possible to enter up to 60 new SIM records per hour. On 5 April, 183 SIM additions were entered, printed, added to the SIM file, and a new SIM master file listing was printed in 4 hours and 45 minutes. The operator experienced minor interruptions even during this period.

3. Outstanding Requisition and Status File

The outstanding requisition and status file built and maintained contains 328 outstanding requisitions and some 124 of the status messages pertaining to these requisitions. This does not include requisitions which were entered into the file and completed during this DEAS shipboard test. The file contains all of the outstanding requisitions for SIM items, all of the high priority outstanding requisitions (priority equal to 9 or less),

and the outstanding requisitions which were initiated during the test. The input time for records on this file includes not only the keying, printing, updating,and report generation times, as for the stock record files, but also includes the time it took the operator to locate and pull the appropriate records from the ship's outstanding file. The outstanding requisitions required 23 hours and 25 minutes to enter, for an average of 14 items per hour. With no interruptions, except for pulling and replacing items in the ship's file, 36 requisitions were entered and printed in one hour on 25 April. (The DEAS system contains a provision to greatly enhance the requisition creation time shown in these figures. The DEAS prototype includes a program for automatic reorder of those carried stock items which the ship desires to reorder. The same program speeds up the requisition creation of not-carried stock items and carried stock items above reorder point by optionally filling in most of the data fields in the requisition with default values. This provision of the DEAS system was demonstrated and well received by the personnel of the supply department. However, the basic set-up of this DEAS shipboard test, that is, operation in parallel with the ship's own manual system with the manual system having the lead, precluded the use of this feature of DEAS.)

The status messages entered required 11 hours and 20 minutes for an average of 11 per hour entered and fully processed. The status data entry required manual input of status messages by keyboard. The DEAS system feature of entering status cards via the card reader was only partially successful because the status cards in the ship's outstanding requisition

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file were somewhat mutilated by being stapled to their corresponding requisitions. The status card reading feature was used to read a batch of 123 new status cards received by 1 May. The time required to read and edit these cards was 5 minutes.

4. Non-SIM Stock Record File

The Non-SIM Stock record file consists of the first 108 items in the ship's own manual Non-SIM file. The file was created in 3 hours and 45 minutes on 1 May and 2 May for an average of 29 items per hour added to the file. The ship's entire Non-SIM file contains approximately 12,000 items. Obviously it was not feasible to key in all of these items during the period that DEAS was on board. An attempt was made to utilize the card reader to read in the COSAL Non-SIM records with manufacturer's software. Unfortunately, an error was found in these routines which DEAS research personnel could not correct on board.

5. Maintenance File

The DEAS maintenance file consists of 2-Kilo forms with corresponding 1250's and 1348's. The maintenance system was designed and programmed just prior to this DEAS shipboard test. It was first tested on 46 2-Kilo's provided by the ship on 2 April. These forms were entered, a maintenance file was created, and a ship's local CSMP option B was printed in 3 hours and 50 minutes for an average of 12 per hour. This average includes extensive checkout of the then new DEAS maintenance system. An additional 20 2-Kilo

forms were obtained from the electronic technician office and the corresponding 33 1250's and 18 1348's were located and processed. Seventy-one documents were entered and fully processed in 7 hours and 20 minutes, which included the time necessary to locate the material in the ship's files, for an average of 10 per hour.

6. Supply Transactions

Transactions processed in the supply office (1250;s, 1348-6's, 1348's, LBI's, etc.) were entered into the DEAS system between 3 April and 5 May. Five hundred and fifty transactions were entered and fully processed in 22 hours and 20 minutes, for an average of 24 per hour. This included all time for updating, data correction and reprocessing, and report generation. Approximately 15 percent of the transactions entered were initially rejected by the update, usually due to the careless recording of units of issue by supply personnel on transaction documents. These errors were researched, the proper corrections were made to the DEAS transaction file, and this file was reprocessed through the update. These errors had the effect of increasing the average processing time of transactions. The number of such errors fell sharply as the personnel became used to the system.

7. Additional Equipment Utilization

NSRDC personnel's equipment usage for system demonstrations, test monitoring, and additional backup tape creation totaled 25 hours and 55 minutes. An additional 46 hours and 5 minutes were used for hardware checkout and programming system improvements suggested by ship's personnel, especially in the DEAS maintenance system.

III. EVALUATION

A. DEAS EQUIPMENT PERFORMANCE

The DEAS breadboard equipment, as explained previously in this report, performed exceptionally well during the 6-week test. At-sea conditions provided the DEAS equipment with a true test of the various vibrations (firing 5-inch guns), stress and pressures (sharp turns, heavy rolls), power fluctuations, and hard knocks (18 to 20-foot seas) that many Navy ships encounter. In fact, the computer equipment responded so well that the manufacturer's maintenance technician accompanying the NSRDC research personnel was off-loaded and sent home on the seventh day of the 13-day voyage. A concluding comment on the DEAS breadboard equipment is simply -- there were no malfunctions.

B. DEAS LOGISTICS SYSTEM PERFORMANCE

The first task, constructing the DEAS data bases, was largely accomplished by the third week to allow processing supply transactions as they occurred within the supply office. The logistics information developed into data bases included: 1) 1114 Sim stock records, 2) 1114 Non-Sim stock records, 3) Outstanding File (1348 Requisitions and Status Messages, input by card reader), and 4) 3-M master file (containing 2-Kilo jobs, 1258 issues, and 1348 requisitions).

The second task was to operate all modules of the DEAS system as part of the ship's daily routine. Both supply department personnel and NSRDC personnel operated the DEAS system on a daily basis -- depending on the availability of

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ship's personnel. The functions performed during the shipboard test are divided into the following subgroups.

- daily functions
- periodic functions

Daily Functions: the system functions performed on a daily basis were continually executed by shipboard and NSRDC personnel. These daily functions are further subdivided below.

a. Input (data entry) of logistics data -- the capture of data for local file updating. The following types of data were captured as they occurred each day.

- 1250 issues
- 1348 requisitions
- status messages

- 1348-1 receipts
- 2-Kilo forms
- 1114 transactions

b. File information searching -- answering stock battery and status requests on a walk-in basis using the automated system.

- stock availability and location
- outstanding status

c. Daily reports -- these reports were generated daily using DEAS, usually at the end of the workday.

- audit trail list (SIM's, requisitions, issues, etc.)
- SIM stock battery list

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d. File maintenance -- at the end of each workday the following files were updated with the day's transactions.

- Sim stock battery file
- Outstanding file

Periodic functions: in addition to functions which were performed daily, other functions were executed on a three-four day basis.

a. Periodic reports -- the following reports were generated at the end of each three or four day period.

- Non-SIM audit trail
- Non-SIM stock battery list
- Candidate reorder list (SIM and Non-SIM)
- Outstanding requisition status list
- Local ship's CSMP
- Local ship's completed maintenance jobs

b. File maintenance

- 3M master file
- Outstanding requisition and status file
- Non-SIM stock battery file

c. Special function -- a DEAS function which does not correspond to any current procedure is the Automatic Requisition Reorder Selection. This feature allows the supply officer to select items for reorder; the system will then generate an automated 1348 requisition form.

At the conclusion of the test aboard the U.S.S. MULLINNIX, the DEAS project accomplished its primary goals for this test. The ship's Captain, Commander Clardy, was highly complimentary of the local ship's CSMP and its utility. The supply department head, Lieutenant Triplett, was using the DEAS generated reports to research problem areas in the supply office files. Chief Petty Officer Pellom complimented the efficiency and accuracy of the DEAS system, and SK-3 Jones enjoyed operating the DEAS computer.

Basically, the DEAS programs and procedures were utilized as a direct replacement for existing manual procedures. The supply personnel adapted readily to running the DEAS tutorial programs (14 hours training, as compared to weeks of training to run a larger computer), and the supply clerks were proficient in interpreting all the information produced by the DEAS system.

C. COMMENTS

1. The tangible benefits of the DEAS system include better management tools and faster supply response. An integral part of the DEAS system test should be to acquaint the ship's department heads with the possibilities of an automated logistics system. However, due to operational training priorities during the exercises, a shipboard conference was not attempted.

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2. Future preparation for a DEAS type of test should include
    leasing another intelligent terminal (five weeks) in order
    to build data bases before the actual test period. Shipboard
    time is better utilized when DEAS is operating in parallel
    with the current supply system rather than building the data
    base during the test. In this way, more time is available
    to evaluate crew acceptance of the system.

3. Trouble-shooting the DEAS equipment could not be evaluated
    since the equipment did not fail.

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